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Detail Description	2015 annual report of Roosevelt elk (Cervus elaphus roosevelti) herd population monitoring and management in Redwood National and State Parks. Elk herds monitored include Old South Operations, Lower Redwood Creek, Davison Ranch, Elk Prairie/Hwy 101 Bypass, Gold Bluffs Beach, Crescent Beach Education Center, and Bald Hills. Also included are known human elk interactions, elk mortalities, and area elk hunt results.

Redwood
National and State Parks

National Park Service
U.S. Department of the Interior

California Department of
Parks & Recreation

2015 HERD UNIT CLASSIFICATION and MANAGEMENT OF ROOSEVELT ELK

Photo: Redwood National and State Parks-
Gold Bluffs Beach, 2015

June 2016

INTRODUCTION

The Roosevelt elk (*Cervus elaphus roosevelti*), the largest of the six recognized subspecies of elk, once occurred from southern British Columbia south to Sonoma County, California. The tribes living in and around what is now Redwood National and State Parks (RNSP or "parks"), the Tolowa, Yurok, Hupa, and Chilula, burned the prairies of the Bald Hills and other forest openings regularly in part to promote the growth of new grass attractive to elk and deer; their use of elk for subsistence presumably had minimal impact on elk populations. With the arrival of European and other foreign settlers intense hunting began in the mid-1800s and the Roosevelt elk's range was highly reduced. In 1848 through 1855, market hunting for elk hide and meat supplied gold miners during the northern California gold rush. When the gold rush was over a large amount of elk habitat was converted to cattle and sheep ranching and croplands, and elk were killed to protect against crop depredation. Elk populations and distribution in the Marble and Siskiyou Mountains and the Salmon-Trinity Alps were significantly reduced (USDI 1983). The only Roosevelt elk populations that persisted through this period were those occupying coastal lowlands in northern California, where dense forests and brush fields provided protective cover. Today Roosevelt elk in California persist only in Humboldt and Del Norte Counties, and extreme western Siskiyou County.

The Redwood National Park 1986 *Elk Management Report* (Hofstra *et al*. 1986) stated the long term goal for elk within what is Redwood National and State Parks is "...an elk population in equilibrium with the environment, regulated by vegetation dynamics, predation, competition with other species, and other natural forces." It goes on to acknowledge that achieving this goal may be "problematic at Redwood, given its configuration, relatively small size, land use history, adjacent activities, and habitat needs of elk."

Work in RNSP

Annual classification of elk herds within RNSP began in 1996 to document relative abundance and simple population characteristics, such as cow numbers, recruitment, and calf survival within known herds (Wallen 1997). These herd count/classifications have been conducted annually each fall since that time by parks staff and others. Also in 1996, a monitoring program of the elk population in the Prairie Creek drainage was established independent of the RNSP program (Weckerly 1996, Weckerly *et al*. 2004). The 2 independent monitoring programs in the same area provided a unique opportunity to compare data gathered unsystematically with data gathered using a science-based approach with a standardized protocol.

Beginning in 2004, elk in the Bald Hills were counted by Dr. Floyd Weckerly using a method he developed (Weckerly and Francis 2004). Unlike the Prairie Creek herd counts, which tend to yield similar results using the parks' and Weckerly's survey methods, the Bald Hills herd counts tended to be quite dissimilar between parks staff and Weckerly, with staff counts consistently undercounting the number of animals. Due to

the inaccuracy of the park staff counts, those counts in the Bald Hills were discontinued in 2008.

METHODS

Seven separate herds have been counted/classified within RNSP in recent years. Attempts were made to count 6 of the 7 herds by RNSP staff from September to November, the fall herd classification period, although 3 herds were not present when staff visited their usual locations during the fall count period. Two of these herds were counted successfully in late June, and the other herd coalesced with another known herd (see Results and Discussion).. The Bald Hills herd was counted 11 times in January, 2016 by Dr. Weckerly. Surveys by Dr. Weckerly associated with Prairie Creek herd monitoring also were conducted in January, 2016. Results from these latter two surveys are considered part of the 2015 elk count period and are included in this report with the fall 2015 information. This is compatible with how survey results have been reported in previous reports. The 7 fall count herd units are:

(1) **Old South Operations Center** (OSOC) herd
(2) **Lower Redwood Creek** (LRCR) herd (sometimes referred to as the "Levee" herd in previous reports)
(3) **Davison Ranch** (DARA) herd
(4) **Elk Prairie/Hwy 101 Bypass** herd (EPBY)
(5) **Gold Bluffs Beach** (GOBB) herd (several co-mingling groups)
(6) **Crescent Beach Education Center** (CBEC) herd
(7) **Bald Hills** (BAHI) herd

Classification counts were conducted by RNSP staff driving or hiking to the identified herd units. Using binoculars and spotting scopes, staff recorded the total number of elk observed, and the total number of elk within each classification group. The groups are mature bulls, spikes (first year males identified by a lack of brow tine off the main beam), cows, and calves. The observers assigned ranking criteria to the classification counts that specified the accuracy of the count, using a scale of 1 to 4. A rating of 1 indicated good visibility and the animals were close enough to accurately count and classify the herd. A rating of 4 indicated that the observation was unacceptable for determining herd composition because of poor visibility due to low light level, fog, vegetation, or topography. In calculating the ratio of calves to adult cows, ratings of 3 and 4 were dismissed due to poor quality of observations. As in previous years, the highest cow counts with a favorable ranking were used as the herd size estimates for 2015.

Fall Count Herd Classification Groups

- **Cows** = all females >1 year old.
- **Calves** = young of the year <1 year old (recognized by spotted coat and small size; later the spots disappear, but they retain a short, rounded snout).
- **Spikes** = year old males exhibiting only a main beam, brow tine absent.
- **Mature bulls** = males ≥2 years, with brow tine evident off the main beam.

Fall Count Herd Observation Ranking Criteria

1 = Good, visibility good and animals close enough to observe with high confidence of an accurate count and classification.
2 = Fair, animals are either distant or not fully cooperative for good confidence in classification (e.g. some vegetation blocking full view or movement into cover while counting).
3 = Poor, animals too far away (e.g. difficult to track individuals or animals are in adjacent hiding cover).
4 = Unacceptable, bad visibility due to low light levels, fog, uncooperative animals.

Elk in the Bald Hills during January surveys were counted from vantage points or approached on foot. A set route was driven/walked on 11 different days. When elk groups were approached on foot it was to obtain an unobstructed view or to conduct a coordinated stalk. A coordinated stalk consisted of an attempt to alert elk groups to the presence of one surveyor in such a manner that the group moved to an area with an unobstructed view where they could be counted by another surveyor. All elk observed were counted and classified as either mature bulls or "cows" using binoculars and field telescopes. In most previous years calves and spikes were combined with female counts (the "cow" count) due to the large size of the herd, however, this year and in 2014 classification of the herd into the 4 disparate age groups was possible. All animals within 50 m (~165 ft) of one another displaying coordinated activity or movement were considered a group (Weckerly *et al*. 2004). As with the other herd counts, the highest reliable cow count was used for the year's herd size estimate.

RESULTS AND DISCUSSION

Fall classification counts, the June counts (for GOBB and EPBY herds) and the January 2016 count for the BAHI herd, for the different age classes are presented in Table 1. It should be noted that the parks' DARA and EPBY herds are combined in Weckerly's "Prairie Creek" herd. Table 1 numbers for DARA and EPBY reflect fall staff counts.

Table 1. Highest number of elk reported within each herd unit and for each classification grouping in 2015. MB = mature bull, SP = spike, CW = cow, CV = calf, n = total fall counts when animals were observed.

Location	MB	SP	CW	CV	Total	n
OSOC	7	4	52	15	78	5
LRCR	0	0	0	0	0	0
BAHI	1	12	131	19	162	11
DARA	3	6	35	10	54	6
CBEC	1	5	40	15	61	3
GOBB*	1	0	12	2	15	1
EPBY‡	4	0	1	1	6	6

*A single count of the GOBB herd was made on June, 30 2015.
‡ The best count when animals were present was on July 8, 2015.

Weckerly's January 2016 estimate for the DARA herd (including animals in Boyes/Elk Prairie or EPBY, which had no elk present in January 2016) was 56 elk **(**F. Weckerly pers. comm.). The staff count for the DARA/EPBY herd was 54 (or 61 when adding in the 5 animals counted in Elk Prairie in June).All classifications matched closely between staff and Weckerly's counts, with an additional cow, calf and spike in the staff's combined EPBY and DARA counts possibly accounting for the (one animal each) difference between the 2 counts. The number of bulls was nearly the same between the staff and Weckerly's counts, with 7 bulls from the staff count and 6 bulls from Weckerly's count between the Elk Prairie and Davison groups combined. This indicates once again that count numbers of these herds between RNSP staff and Weckerly are comparable.

Cow counts by year, the best indicator of herd persistence (McCullough *et al*. 1994, Weckerly and Francis 2004), are displayed in Figure 1. Cow numbers for all herds for all years are provided in Appendix A. In 2015, the OSOC herd tripled over last year to the highest number ever recorded, but the LRCR herd was not observed and was presumed to have coalesced with the OSOC herd. This is the likely explanation for the dramatic increase/decrease of each respective herd.

No cows were recorded in the EPBY herd in the January, 2016 counts (F. Weckerly pers. comm.) or in RNSP staff counts in September – November of 2015, however, 1 cow was observed with a calf late June and early July, 2015. The GOBB herd normally ranges widely over a large area and is difficult to count; this year's opportunistic late June count was a further indication of a fracturing of this herd that has been evident off and on over the years..

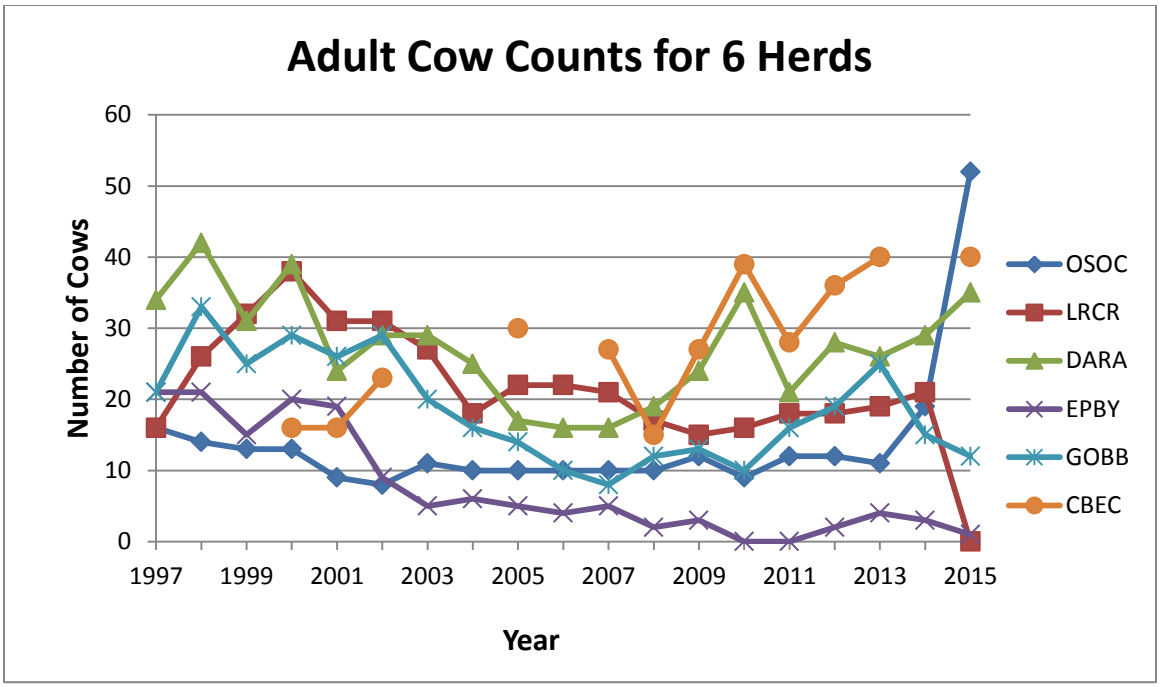

Figure 1. RNSP fall elk herd cow numbers from 1997 to 2015 indicating herd persistence through time. The CBEC herd counts did not begin with regularity until 2007; this herd was not counted in 2014 and some previous years.

The highest fall cow count in each herd was used to determine calf:cow ratios; the ratio of calves to cows is an indication of herd productivity. The ratio of calves to cows in the combined OSOC/LRCR herd was down by approximately half of the combined ratios for the 2 separate herds in 2014 and in fact was at its lowest in 3 years (Table 2).

The calf:cow ratio in Weckerly's "Prairie Creek" herd was 0.29 in January 2016 (Weckerly unpub. data). The fall staff counts indicated a calf:cow ratio of 0.30, when the EPBY and DARA herds were combined. In 2015, staff counted 11 calves in the 2 herds combined; Weckerly's count was 10.

This year Weckerly (unpub. data) was able to calculate calf:cow ratios for the Bald Hills herd. This is only possible when conditions for counting are optimal, e.g., the herd is in clear view and staying fairly still. The calf:cow ratio for this herd was 0.15 in January, 2016.

Table 2. Calves per 100 cows for coastal elk herd counts, 2003 to 2015 (N/A = data not available).

Herd	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
OSOC	27	10	40	30	40	40	25	55	16	8	45	32	29
LRCR	11	22	18	45	33	23	20	56	44	61	58	29	0
DARA	21	24	12	18	56	37	33	22	38	18	42	38	29
EPBY	20	50	0	25	60	100	33	0	0	50	50	100	100
GOBB	15	6	17	30	50	50	54	60	44	53	20	53	17*
CBEC	N/A	N/A	N/A	N/A	30	40	30	5	14	28	20	N/A	37

*A single count of the GOBB herd was made on June, 30 2015.

The highest fall cow count in each herd also was used to determine bull:cow ratios. One reason for monitoring bull:cow ratios is that these ratios may indicate the quantity of available forage. When food is less abundant males may use forested habitats more frequently (Bliss and Weckerly 2016), making direct observation difficult (Weckerly *et al*. 2004, Weckerly 2007). Figure 2 displays the bull:cow ratios for the 6 herds monitored by park staff in the fall of 2015. Weckerly reported a bull:cow ratio of 0.17 for his "Prairie Creek" herd, the same ratio as the staff's count for the EPBY and DARA herds combined. The BAHI herd bull:cow ratio was not calculated due to the potential for some bulls in this herd to go undetected in January (F. Weckerly pers. comm.).

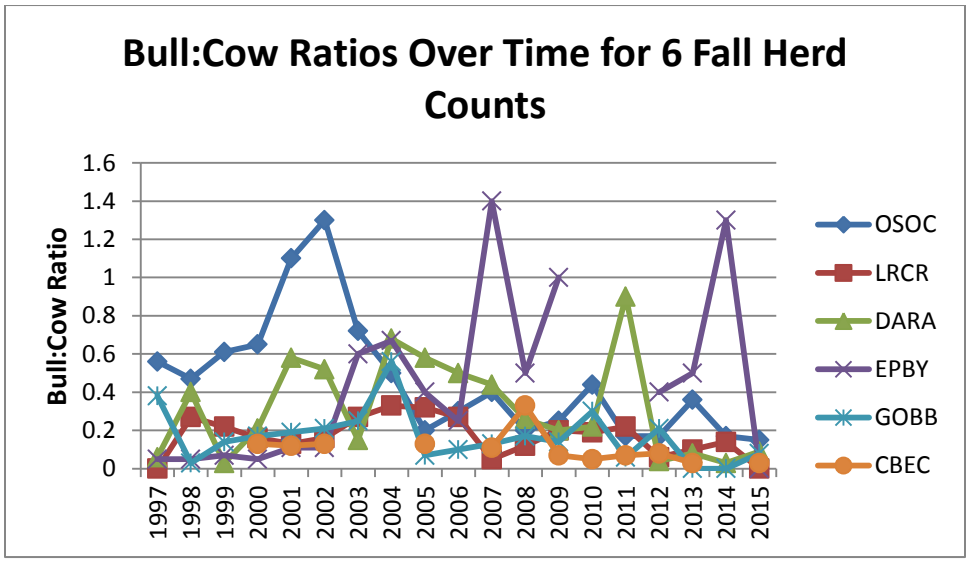

Figure 2. Bull:cow ratios from 1996 to 2015 indicating herd reproductive capability through time. The CBEC herd has not been counted consistently every year and was not counted in 2014.

Herd Summaries

Old South Operations Center (OSOC) and Lower Redwood Creek (LRCR) Herds

The cow and total herd count for the OSOC herd was the highest it's been since herd classification began in 1997. It is believed that the LRCR herd likely joined the OSOC herd, thereby tripling the latter herd's size in the past year. Calf production was good, with at least 15 calves persisting into the fall this year. This is the first record of complete herd fusion for these 2 herds, but there was some indication the process began in 2014 (RNSP 2014).

Weckerly (pers.comm.) stated that elk herds create virtual "fences" that are primarily of a social nature versus driven by food availability. Inter-herd aggression is likely to cause reduced food intake, thus, herd overlap is generally avoided, especially when food is scarce. Fusion of the OSOC and LRCR herds may indicate an increase in food supply in the Orick Valley (e.g., access to private pasturelands) that caused the herd "fence" to break down and allow herd coalescing (Kolbe and Weckerly 2015, F. Weckerly pers. comm. 2016).

Davison Ranch (DARA) Herd

This herd consists of a group of mature bulls that often occupies the northern portion of Elk Meadow north to the Lost Man Creek Fish Hatchery, and a group of cows, spikes, and calves that occupies the southern portion of Elk Meadow south to Skunk Cabbage Creek. These animals also frequent the Redwood Adventures Lodge area, the lawn of the Valley Green Office (Green Diamond Resource Co.), and the cow pasture at the former Mill A site , all on the east side of Highway 101. The number of cows counted (35) was up from last year's and exceeded by 6 the previous 10-year high of 29, but was lower than the 42 and 39 cows counted in 1998 and 2000, respectively. The calf:cow ratio was down to 0.29 from 0.38 in 2014. The bull:cow ratio was low, at 0.09, however Weckerly reported a bull:cow ratio of 0.17 in January that included 5 bulls in Boyes Prairie.

Elk Prairie / Hwy 101 Bypass (EPBY) Herd

In 2015, no elk were observed within Elk Prairie (= Boyes Prairie) in the fall. There were, however, 4 bulls, 1 cow and 1 calf present in early July. The number of bulls was down from the 9-10 bulls present in Elk Prairie throughout 2013 and 6 present in 2014.

Gold Bluff Beach (GOBB) Herd

The GOBB herd is comprised of several sub-herds that come together on occasion. They use a large area that extends from Mussel Point at the south end of Gold Bluffs Beach to Carruther's Cove near the northern limit of this beach, a distance of 12 miles. They also on occasion leave the beach area, moving into the forest above the beach and east towards Newton B. Drury Parkway. This herd is difficult to count because of the large area the animals use and the brushy nature of the coastal bluffs which can obscure

individuals. However, despite the lack of fall classifications, the number of cows counted (12) in June approximated numbers during most years since 2002. Prior to 2002, between 21 and 33 cows were counted. In 2015, just one bull was seen during the count on June 30, and 2 bulls were observed in the campground on October 2.

Crescent Beach Education Center (CBEC) Herd

Although the cow number was equal to the number in 2013 (there was no count in 2014) the cow:calf ratio was lower at 0.37, but yet was the second highest since counts for this herd were begun in 2007, , indicating high relative productivity. The cow numbers were comparable with most of the past five years and the bull:cow ratio was equal to the low number in 2013, the lowest ratios on record, with just 1 bull reported with 40 cows.

Bald Hills (BAHI) Herd

There were 11 counts in the Bald Hills in 2016, from January 2 to January 21. This year the high count for the BAHI herd was 180 (during the final survey), a large decrease compared to the 269 elk counted in 2015. Weckerly (pers. comm.) speculated that either the population had declined dramatically since last year, or the elk were in areas that were not surveyed; he suspected the latter. The herd was found on park lands in all 11 surveys and numbered from 67-162 except for the 11th count on January 21. Surveys were conducted on the adjacent private Stover Ranch lands during 6 of the 11 surveys; elk sub-herds were detected at Stover's on occasions including the 9th and 11th surveys. Two bulls were observed in 2015. Herd classification was possible on 8 of the 11 surveys; the best classification included 131 cows, 19 calves, 12 spikes, and 2 bulls. The calf:cow ratio was 0.14, down from last year's ratio of 0.31.

Winter survey routes in the Bald Hills were displayed in previous Annual Elk Reports (through 2008).

Other Observations

There were 13 opportunistic staff or visitor observations of elk recorded in the parks' Wildlife Observation database in 2015. One unusual sighting was of a group of 18 elk foraging at the A-9 Deck on the West Side Access Road. Elk are rarely reported from that area. There was a group of 10 elk standing in Childs Hill Road in the Mill Creek addition to Del Norte Coast Redwoods State Park, of interest due to the few reports of elk from this area. At least 6 of the 13 opportunistic reports were of elk on trails, 4 on Redwood Creek, 1 on Coastal and 1 on James Irvine Trail. There were 1 or 2 reports of elk up Redwood Creek as far as Bridge Creek.

Incidents

Calving Season

In 2015, there were 2 incidents involving aggressive cow elk reported, both in the same location north of the Fern Canyon trailhead on Coastal Trail just south of Gold Dust Falls. In the first occurrence on June 23, a single female adult elk made numerous

"bluff" charges at a family of visitors walking along the Coastal Trail approximately 1 mile north of the Fern Canyon trailhead. The cow elk got to within 15 yards of the visitors before ceasing the bluff charges. No one was hurt in the incident. The second incident occurred on July 7, when multiple visitor groups were in the same area and again were charged by an aggressive female elk. One group of visitors became trapped behind trees they sought as refuge for 30 minutes and another reported the elk charged as near as 3 feet away. No one was hurt in the incident. RNSP law enforcement rangers temporarily closed this section of Coastal Trail.

Rut

In approximately the same location as the 2 incidents involving the cows, a bull elk with a harem of 8 cows aggressively charged a park staff member, forcing him into the trees for cover. The bull urinated, dragged its antlers through the grass, and bared its teeth. The park staffer threw sticks at the bull and the bull retreated. No one was hurt in the incident.

Entanglements

No elk were reported to be entangled in any human detritus in 2015.

Mortality/Injury

Five mortalities, of various causes, were reported in 2015. On January 26 park law enforcement reported a poached cow elk found butchered just off of the Bald Hills Road in the Child's Hill Prairie. On January 27 a group of 4 bulls were poached and butchered to the east of the US Hwy 101 Prairie Creek Bypass just outside the park boundary. Ear tags reportedly observed in 2 of the bulls taken indicated all of these animals were bulls from the EPBY group, a huge loss to this recovering herd. On February 9 a yearling elk was seen by park staff being attacked and killed by an adult bull elk in the grassy area opposite the turnoff to the Lost Man Creek picnic area. The bull knocked the yearling down and stomped on it repeatedly. On June 3 a park staff member struck and killed an adult cow elk on US Hwy 101 near the park boundary at the base of the hill approaching Crescent City. The employee's vehicle sustained substantial damage, but fortunately he was not injured. On September 27 a healthy looking cow elk was reported dead and investigated by park biologists on Streelow Creek Trail with no visible cause of death. She may have had a calf with her when she died; the ranger who discovered the dead cow saw a calf running around by itself on a nearby road.

Annual Elk Hunts

The Northwestern Hunt is now the only large, non-Private Lands Management (PLM) hunt that may impact RNSP elk herds. The Northwestern Hunt involves lands in Humboldt and Del Norte Counties and may take elk that wander outside park boundaries. Forty-five tags were issued for either-sex elk in 2015 and there was a 78% success rate with the hunt, equating to 35 animals taken (https://www.wildlife.ca.gov/Hunting). Eight

bulls were taken from the Orick Valley in association with this hunt, including 1 bull associated with the OSOC herd that was taken. Park staff were visiting a stream restoration project adjacent to private ranch land in the Orick Valley during hunting season. They heard gunfire and saw a large alpha bull drop dead nearly in front of them (on private land).

The Klamath Hunt formerly took place on Green Diamond Resource Company lands adjacent to the parks. This hunt was dissolved in 2015 and Green Diamond, along with other private land managers that allow hunting within the former Klamath Hunt zone, became part of the PLM Program. Thus, the Klamath Hunt is now referred to as the "Klamath PLM" hunt. In 2015, 2 bulls were taken by this hunt. The Stover Ranch PLM, that also borders the Bald Hills in the park, removed 4 bulls and 1 antlerless in 2015. It is possible that each of these PLM hunts removed elk from the Bald Hills herd that often resides in the park.

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Report Prepared by Keith Bensen and Kristin Schmidt, Redwood National and State Parks

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PERSONAL COMMUNICATION

Dr. Floyd "Butch" Weckerly, Professor, Texas State University, San Marcos, TX

Appendix A

Highest reliable (ranking <3) cow counts for identified elk herds, 1997 to 2015 (data displayed, in part, in Figure 1 in the report). ND = no data available for that year.

Herd	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
OSOC	16	14	13	13	9	8	11	10	10	10	10	10	12	9	12	12	11	19	52
LRCR	16	26	32	38	31	31	27	18	22	22	21	17	15	16	18	18	19	21	0
BAHI	45	98	62	104	54	35	26	241*	251*	278*	270*	244*	261*	225*	241*	242*	240*	188*	131*
DARA	34	42	31	39	24	29	29	25	17	16	16	19	15	23	21	28	26	29	35
EPBY	21	21	15	20	19	9	5	6	5	4	5	2	3	0	0	2	4	3	1**
GOBB	21	33	25	29	26	29	20	16	14	10	8	12	13	10	16	19	25	15	12***
CBEC	ND	ND	ND	16	ND	23	ND	ND	30	ND	27	15	27	39	28	36	40	ND	40

* Counts conducted by Weckerly account for differences in herd counts beginning in 2004. The "cow" counts represent cow, calf and spike groups.

**From opportunistic counts in late June 2015.

***From a single opportunistic count on 30 June 2015.